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The pandemic is taking a toll on everyone — but the burden is larger for disadvantaged groups.

## 'YOU ARE ALWAYS LIVING UNDER UNCERTAINTY'

Junior scientists who are members of minority ethnic groups or are financially disadvantaged describe the support they need.

**T**he coronavirus pandemic has affected the entire scientific world, but in unequal ways: although some scientists have been able to carry on with their lives and careers, many are struggling with family obligations, financial strain and tenuous employment.

The pandemic has already dimmed job prospects in academia, and the full impacts are probably yet to be seen. Global gross domestic product — the total value of goods produced and services provided — is forecast to shrink

this year by 4.9%, according to a study by the Pew Research Center in Washington DC. That decline is expected to hit low-income communities and nations especially hard.

For students and postdocs from less-privileged backgrounds — first-generation students, members of minority ethnic groups or those with financial stress — the pressures of the pandemic are, and will continue to be, particularly intense. “There are a lot of concerns about very talented individuals falling out of the pipeline,” says Barbara Natalizio,

chair of the US National Postdoctoral Association, based in Rockville, Maryland, which represents around 79,000 postdocs.

The current crisis must be a call to action, says Bea Maas, an ecologist at the University of Vienna. Maas was the lead author of a June report on the precarity of early-career researchers during the pandemic’s first wave. “There must be a collective effort by the entire scientific community, especially those in leadership positions, to respond to the short- and long-term challenges of this crisis and to

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protect decades of efforts to build an inclusive scientific community," she says.

*Nature* asked five early-career researchers from under-represented groups to share what they've experienced in the pandemic and their thoughts about surviving in the research enterprise.

### CHRYSTAL STARBIRD BEARING A HEAVY EMOTIONAL BURDEN

I'm the co-founder and co-chair of the Yale Black Postdoctoral Association at Yale University in New Haven, Connecticut. Balancing everything during the pandemic has been one of the biggest challenges of my life, which is saying something because I've been through a lot. On a typical day, I get up at 4:30 or 5:00 a.m. and go to the laboratory for a few hours. Then, I come home and help my three kids (ages 16, 14 and 7) with their school work. I go back to the lab in the evening and work late.

My husband is a full-time student, so he can spend a lot of time at home. I'm grateful for that, but we still have disadvantages. Some of my peers have hired tutors to help with schooling during the pandemic. We can't afford that.

For minorities, day-to-day struggles are compounded by what we see on the national level. I'm not a very emotional person. But there have been days after a shooting or killing when I've had trouble focusing. It's extremely heavy. We're carrying a lot of extra weight that makes it difficult to be scientifically fruitful.

I know people from all walks of life and of many nationalities, and it's obvious to me that Black and Hispanic communities are being hit especially hard by the pandemic. You hear about someone's aunt, sister, grandmother or cousin dying or going to hospital. People are coming to the lab and collecting data while their families are falling apart around them. I'm amazed by their strength.

University administrators, funders and stakeholders must think about how to level the playing field going forward. Yale has accomplished positive things, including grants to help postdocs who have lost funds because of the pandemic. They've also expanded the number of available slots at their daycare programmes, but those cost more than US\$2,000 per month. I don't know how helpful that's supposed to be for a postdoc parent. There's a real sense that universities are out of touch with what disadvantaged students are enduring.

Researchers from minority ethnic groups are seeing job opportunities that maybe didn't exist before the launch of diversity initiatives this year. There's a lot of enthusiasm at Yale and elsewhere in the United States for hiring scholars of colour – but those scholars are extremely overwhelmed. They might

not have the confidence to take advantage of those opportunities. They're still not sure that academia really wants them to be there.

I encourage minority scientists to seize opportunities in academia and industry. Many companies are realizing there's a problem with the make-up of their board, and they're ready to embrace diversity in their hiring. Now is the time for us to take advantage of momentum.

**Chrystal Starbird** is a structural biologist postdoc at the Yale School of Medicine, New Haven, Connecticut, and co-chair of the Yale Black Postdoctoral Association.

### EMMA HERNANDEZ-SANABRIA FOREIGN STUDENTS ARE UNCERTAIN OF THEIR PLACE

Since the pandemic broke out, I think many people have been feeling really stressed, including myself. You are always living under uncertainty. At European institutions, you don't know how long you are going to be able to stay if you are from elsewhere (I grew up in Mexico and got my PhD in Canada before moving to Belgium for my postdoc in 2016). If you don't have a permanent position (this is my fourth postdoc), life is very precarious.

Like many foreign postdocs in Europe, I'm on a short-term contract. Unlike some European researchers who participate in tax-free funding schemes, I have to pay my own income taxes, and I don't have any job security. Many international students feel stuck because they

don't know whether they can go back to their own country, but they also don't know whether they can stay where they're at. Either way, they wonder whether they will have enough results to defend their thesis.

I was not working in the lab for three months, and I am at a career stage in which I need to produce results. I am researching the human microbiome, and it's one of the most competitive fields in science right now. Analysing data is something that you can do at home, but it's not the same as producing results in the lab.

On the positive side, I've been able to rethink my routine. Sitting at a computer for nine hours per day isn't necessary for computational work. Flexibility is important for mental health, and universities should support that. I hope that funding agencies embrace flexibility and change how they measure productivity.

**Emma Hernandez-Sanabria** is a senior microbiology postdoc at KU Leuven in Belgium.

### ZEMMY ANG THERE ARE PROS AND CONS TO VIRTUAL LEARNING

More funding would be a huge help. Students from disadvantaged countries who want to become academics or researchers need help. I have friends who would be very happy to go overseas and then to graduate school, but they can't because they have to get jobs to support their families. The pandemic will make things



Emma Hernandez-Sanabria working with a simulator of the human microbial ecosystem.

EMMA HERNANDEZ-SANABRIA



PhD student Zemmy Ang.

that much harder. They'll have to put their plans on hold, or just not pursue them at all.

Even with things going virtual now, classes are challenging – describing your equations over Zoom is much harder than writing out what you think on the whiteboard in class.

I'm trying to imagine what my friends in the Philippines, where I'm from, are facing. Everything is shut down, and it might be impossible for them to do their work. When I lived there, I once had to give a Skype presentation from a cafe because it was the only place nearby that had a reliable Internet connection.

Before the pandemic, my Filipino passport limited me to conferences in Singapore and Hong Kong. I didn't have the visas that I would need to attend conferences in the United States, United Kingdom or Europe. That's a big challenge for early-career researchers from the developing world. Not being able to go to conferences puts students from disadvantaged backgrounds even further behind. So in a way, going virtual is great, although it's not ideal to network while staring at screens.

**Zemmy Ang** is a PhD student in electro-optical engineering at Ben-Gurion University of the Negev, Israel.

## ROSA FERRERIA CONCERNS OVER AN UNCERTAIN FUTURE

My path to science is really unconventional. I was born and raised in the Dominican Republic. My family came to the United States when I was 16, and I taught myself English when I was 17. I was living on the street before I put myself through college, while working with

older people. Now, I'm doing remote work in physics with Arizona State University in Tempe so that I can apply to a PhD programme.

I live in New Jersey, and there are no PhD programmes near me with courses I want to take. I can't just leave, because I'm a single parent. I have to take care of everything on my own.

I am doing as much research as I can. People used to look down on remote academic work, but that's changing. It's useful for people like me, who don't have those programmes nearby. I'm afraid to move to Arizona, not only because of all the pandemic uncertainty but also

**“Stories like mine are a real wake-up call for people who aren't used to struggle.”**

because people have told me that minorities don't always feel welcome in that state. Aside from the money problems, this programme could create many mental and emotional issues for me, so there's a lot to consider.

I've been working for years to start a PhD programme, but I don't know whether I can get the funding for one. Even before the pandemic, none of the institutions I contacted walked me through the ins and outs of financing a PhD.

I want to be an astronomer, but now I don't know whether that will work out. I'm really scared about it. I have no idea how things will change as the pandemic worsens, but it doesn't look good. Stories like mine are a real wake-up call for people who aren't used to struggle.

**Rosa Ferreria** is a remote undergraduate student in physics at Arizona State University in Tempe.

## DANIEL GONZALES IT'S TIME TO MAKE ACADEMIA MORE INCLUSIVE

When everything shut down in March, it took me a couple weeks to settle into working from home. But I don't think anyone quite knows the full repercussions of the shutdown. Even now, research is still slow in many places and will probably continue to be slow for six or eight more months, or maybe a year. For the three months that I couldn't enter the lab, I tried to remain positive.

I had time to think about some theoretical aspects of the work that I had previously never had a chance to consider. The pandemic gave us an opportunity to sit back and develop some really cool theories for the technologies that we're working on, including nanoelectric devices that would allow for both electrical and optical recordings of neural activity.

Because my job has been stable during the pandemic, I've been thinking more about systemic racism and what I can do to support the racial-justice movement Black Lives Matter. I'm thinking about what kind of culture we want in academia and how to foster an inclusive culture that's empowering to people from all different types of backgrounds.

We need to let more people know about opportunities and make academia more inviting. For example, I grew up in a rural part of West Texas, and I was able to go to my hometown university thanks to a wonderful scholarship for first-generation students that paid for my schooling expenses for four years.

There were so many things I didn't know as a first-generation student. I didn't realize that most graduate programmes in science, technology, engineering and maths were paid for. I didn't realize you got a stipend. I didn't realize there were health-care benefits.

I chose the applied-physics programme at Rice University in Houston, Texas, for graduate school because it didn't require the physics graduate-admissions examination, which would have cost money. I knew I wanted to run a research lab, but just didn't think that I could personally achieve that. But a series of mentors empowered me to do so.

Researchers and administrators need to ask themselves why they're not having more of the conversations that will make science more inclusive.

**Daniel Gonzales** is a physics postdoc at Purdue University, West Lafayette, Indiana.

**Interviews by Carrie Arnold and Chris Woolston**

These interviews have been edited for length and clarity.

**Correction**

This Careers feature understated the number of postdoctoral researchers that the US National Postdoctoral Association represents. The actual number is around 79,000, not 40,000.